



(19) Europäisches Patentamt  
European Patent Office  
Office européen des brevets



(11) EP 1 121 882 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention  
of the grant of the patent:  
21.05.2003 Bulletin 2003/21

(51) Int Cl.7: **A47J 31/40**

(21) Application number: 00204488.1

(22) Date of filing: 13.12.2000

(54) **Automatic unit for preparing espresso coffee**

Automatische Espressomaschine

Appareil automatique pour la préparation d'espresso

(84) Designated Contracting States:  
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU  
MC NL PT SE TR

Designated Extension States:  
SI

(30) Priority: 07.02.2000 IT B0000053

(43) Date of publication of application:  
08.08.2001 Bulletin 2001/32

(73) Proprietor: Petroncini Impianti S.R.L.  
41100 Modena (IT)

(72) Inventor: Bonanno, Francesco  
40041 Gaggio Montano (Bologna) (IT)

(74) Representative: Corradini, Corrado et al  
Studio Ing. C. CORRADINI & C. S.r.l.  
4, Via Dante Alighieri  
42100 Reggio Emilia (IT)

(56) References cited:  
EP-A- 0 887 036 US-A- 5 755 149

EP 1 121 882 B1

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

## Description

[0001] This invention relates to a completely automatic unit for preparing espresso coffee, in which the various mutually moving parts are operated by the pressurized water delivered by the service pump, further electrical or pneumatic controls being absent.

[0002] The known art provides automatic espresso coffee dispensing units comprising mutually moving parts driven by electrical actuators controlled by sophisticated means, to ensure that the coffee powder is subjected to the correct pressure necessary to obtain a drink having the required quality.

[0003] EP 887036 discloses an Espresso machine with brewing unit having two-part brewing chamber, heater, spray head and spring.

[0004] Two relatively movable parts when closed form a brewing chamber for the filter capsules.

[0005] One of the two brewing chamber parts is connected to a heater for the brewing water, and has a spray head.

[0006] One, the second, of said two parts comprises a compartment for the coffee powder, and is rigid with a movable hollow body mounted on a fixed hollow body to create a variable volume chamber connected to a pressurised water source and to discharge.

[0007] The spray head in the first brewing chamber part is movable and, at least during the preparation of the coffee, is exposed to force, exerted by a spring, in the direction of the other brewing chamber part or in the direction of the filter capsule contained in the brewing chamber.

[0008] The filter capsule is compacted by the pressure applied by the spray head, and the brewing water flows through more slowly, thereby improving extraction.

[0009] The machine of EP 887036 present the drawback of a difficult charge of the filter capsule containing the fresh coffee powder, and of the discharge of the exhaust capsule.

[0010] Further the machine is not suitable to accept rigid filter capsules.

[0011] Dispensing units of known type are complicated and costly, are difficult and onerous to maintain, and have to be installed by specialised personnel possessing the necessary equipment.

[0012] The main object of the invention is to provide an espresso coffee dispensing unit of simple and economical construction, installation and assembly, and which can be used without difference either in automatic machines for professional use, or in machines intended for domestic use.

[0013] A further object of the invention is to provide a coffee dispensing unit of the aforesaid characteristics, which can be used with loose ground coffee, or with sachets or capsules pre-filled with ground coffee.

[0014] A particular object of the invention is to provide a dispensing unit able to use those pre-filled sachets of

coffee powder of the capsule type comprising a semi-rigid cup with a filtering base and top, and provided with a support collar.

[0015] The main object of the invention is attained by an automatic espresso coffee dispensing unit according to claim 1.

[0016] The remaining objects are all attained according to the invention by a dispenser having the characteristics stated in the claims.

[0017] The merits and constructional and operational characteristics of the invention will be apparent from the ensuing detailed description, which illustrates two preferred embodiments thereof with the aid of the figures of the accompanying drawings.

Figure 1 is a horizontal section through a first embodiment of the invention in its rest position.

Figure 2 shows this latter in its first operative phase.

Figure 3 shows this latter in its second operative phase.

Figure 4 is a section on the line IV-IV of Figure 2.

Figure 5 is a horizontal section through a second embodiment of the invention in its rest position.

Figure 6 shows this latter in an operative phase.

Figure 7 is a section on the line VII-VII of Figure 5.

Figure 8 shows a possible hydraulic circuit for the device.

[0018] The dispensing unit 1 shown in Figures 1 to 4 comprises a normal hot water delivery means 2 from which two cylindrical rods 3 extend towards the right to support a fixed plate 4.

[0019] The rods 3 carry mounted thereon a fixed hollow body 5 provided with a cylindrical inner cavity 53 in which a movable hollow body or first hollow piston 7 slides in sealed relationship, or a first hollow piston 7 with interposed gasket 8.

[0020] From the base of the cylindrical cavity 53 there extends a conduit 52 connected to the pressurized water circuit (see Figure 8).

[0021] The first hollow piston 7 presents at one end a flange 71 which is also mounted on the rods 3 and is connected to the plate 4 by a first spring 72 of tension type which maintains it resting on the body 5.

[0022] The first hollow piston or movable hollow body 7 carries upperly fixed thereto a cylindrical jacket 73 within which a second piston 9 slides by way of an interposed gasket 10.

[0023] The second piston 9 presents an axial conduit 91 which extends to the right into a tube 92 which sealably passes through the base of the first hollow piston

7 and the base of the cylindrical cavity of the body 5 to reach beyond the plate 4; the gaskets 11 and 12 provide the seal.

[0024] The second piston 9 presents at its left end a depression 93, from the centre of which there extends said axial conduit 91, and which is closed by a perforated plate 94.

[0025] On the opposite end of the tube 92 there is mounted a disc 95 which acts as a support for a second spring 13 of compression type acting between said disc and the base of the body 5.

[0026] The disc 95 is slideable axially on the tube 92, which has its end externally threaded for a short distance, and is maintained in position by a nut 96 screwed onto the tube 92.

[0027] The springs 13 and 14 are compressed to a greater or lesser extent by screwing down the nut 96 to a greater or lesser degree.

[0028] A third spring 14 of compression type is positioned between the base of the second piston 9 and the base of the first hollow piston, to maintain the end of said the second piston at the level of the cylindrical jacket 73 as shown in Figure 1.

[0029] The two rods 3 carry axially slideable thereon a hollow body 15 which has two cavities receiving a pair of fourth springs 16 of compression type, and has an axial dimensional such that its left end is flush with the cylindrical jacket 73.

[0030] An elastic pawl 17 is securely fixed to the flange 71 of the first hollow pistons 7, and is inserted elastically into a seat provided in the annular body 15.

[0031] The annular body 15 upperly presents a radial conduit 151 well visible in Figure 4.

[0032] The aforescribed unit is shown in its rest position in Figure 1.

[0033] When it is desired to dispense espresso coffee, the elastic pawl 17 is pressed with one finger in the direction of the arrow 18, so releasing the annular body 15 from the flange 71 of the first hollow piston 7.

[0034] By virtue of the thrust of the fourth springs 16, the annular body is moved into contact with the hot water delivery means 2, so creating a cylindrical compartment 152 into which coffee powder is fed via the conduit 151.

[0035] This position is shown in Figure 2.

[0036] When the ground coffee has been fed into said cylindrical compartment, the service pump and the two-way valve 103 are operated to feed pressurized water below the first hollow piston 7, this latter being displaced until the cylindrical jacket 73 makes sealed contact with the wall of the distributor 2 and the flange 71 makes contact with the annular body 15 to cause the pawl 17 to snap-operate and hook onto the annular body, as shown in Figure 3.

[0037] The second piston 9 withdraws against the action of the third spring 14 to maintain the coffee conveniently pressed.

[0038] The unit is hence ready to dispense the coffee, which is achieved by opening a timed valve 106 (Figure

8), to deliver hot water.

[0039] When delivery is complete the valve 106 returns to its initial position, to discharge the hot water lying within the circuit between it and the spring-loaded valve 105, then the valve 103 is again operated to return it into its initial position, and discharge the water acting against the first hollow piston, so enabling the first spring 72 to reposition this latter and the annular body coupled to it as shown in Figure 1.

5 [0040] With reference now to Figures 5 to 7, these show the hot water delivery means 2 with which there is associated a plate 20 provided with a central groove 21 the edges of which present two parallel projecting ribs 22 for supporting and guiding the upper rim 31 of a capsule 30 containing ground coffee.

10 [0041] Said ribs are interrupted at the position in which the capsule is axially aligned with a cylindrical jacket 41 which projects from a body 40 in the shape of an inverted cup corresponding to the hollow body 5 of Figure 1 slightly modified.

[0042] This latter is sealedly mounted, via a gasket 421, on the outside of a fixed piston 50 which is joined to the plate 20 at a precise distance therefrom by two rods 23 on which the cup-shaped body 40 is slidingly mounted.

15 [0043] Two springs 51 mounted on the rods 23 maintain the cup-shaped body 40 against the fixed piston 50, as in Figure 5.

[0044] The cylindrical jacket 41 contains a spring 42 which when in its rest position reaches flush with the outer edge of the jacket.

[0045] The interior of the cup-shaped body communicates with the pump 101 via a conduit 44.

[0046] The interior of the cylindrical jacket communicates with the outside via the conduit 46 through which the coffee is dispensed into a cup.

[0047] The second embodiment of the invention operates in the following manner.

[0048] When the dispensing unit is in its rest or stand-by position, it is configured as in Figure 5. A capsule 30 is made to slide from the outside by falling along the ribs 22 until it lies coaxial with the jacket 41.

[0049] In this position the ribs are interrupted, and the capsule rests on the retractable pin 232 of Figure 7.

20 [0050] Operation of the service pump 101 and valve 103 causes the cup-shaped body 40 to advance until the edge 440 sealedly rests against the edge of the perforated base 32 of the capsule 30, pressing it in its turn sealedly against the plate 20, to attain the configuration of Figure 6.

[0051] The retractable pin 23 is withdrawn electro-magnetically when the jacket 41 supports the capsule.

[0052] Advancement of the body 40 simultaneously causes compression of the spring 40 against the perforated base 32 of the capsule 30.

[0053] After passing through the heater 104, hot water is delivered by means of the pump 101 and valve 106 for a predetermined time, it filtering through the capsule

30 to collect in the form of espresso coffee at the exit of the conduit 46.

[0054] When this delivery has ended, it is a sufficient to halt the pump and again switch firstly the valve 106 and then the valve 103, to discharge firstly the excess hot water then the water contained between the cup-shaped body 40 and the hollow piston 50, this enabling the springs 51 to return the cup-shaped body 40 into its initial position shown in Figure 5.

[0055] Withdrawing the cup-shaped body 40 with the relative jacket 41 distorts the spring 42 which maintains the capsule 30 perfectly aligned with the ribs 22 along which its slides, to fall outside the system when completely released from the jacket 41 and no longer compressed by the spring 42.

[0056] Both the aforescribed preferred embodiments are of horizontal axis, however it is apparent that with a few obvious modifications the device can also be constructed of vertical axis.

#### Claims

1. An automatic espresso coffee dispensing unit comprising hot water delivery means (2) and, for containing coffee powder or a capsule, a compartment (47, 152) to be moved into sealed relationship against said delivery means, said compartment being in the form of a cylindrical jacket (73, 41) rigid with a movable hollow body (7, 40) which is sealedly mounted on a fixed hollow body (5, 50) to create a variable volume chamber connected via a two- or three-way valve alternately to a pressurized water source and to discharge, **characterised in that** said movable hollow body (7, 40) is slidable on two rods (3, 23) which connect the fixed hollow body to the hot water delivery means, and is, in its rest position, maintained in contact with the fixed hollow body by elastic means (72, 51).
2. A unit as claimed in claim 1, **characterised in that** the base of the compartment (47) containing coffee powder consists of a perforated wall movable elastically in opposition to a spring.
3. A unit as claimed in claim 1, **characterised in that** the base of the compartment (152) containing coffee powder consists of a piston (9) presenting, for exit of the infused liquid, an axial conduit (91) extending into a tube (92) which sealedly passes through the base of the movable hollow body and the base of the fixed hollow body.
4. A unit as claimed in claim 1, **characterised in that** between the movable hollow body and the hot water delivery means there is provided an annular body (15) which is mounted on the outside of said jacket (73) and can assume a withdrawn position in con-

tact with said movable hollow body and an advanced position in contact with said delivery means.

5. A unit as claimed in claim 4, **characterised in that** between said annular body (15) and said movable hollow body (7) there are provided elastic means (16) arranged to advance the annular body into contact with the delivery means, and an elastic pawl (17) arranged to maintain the annular body in contact with the hollow body.
6. A unit as claimed in claim 4, **characterised in that** said annular body (15) presents a substantially radial conduit (151) through which loose coffee powder is introduced.
7. A unit as claimed in claim 4, **characterised in that** said annular body (15) is slidably mounted on the rods (3) which connect the hot water delivery means (2) to the fixed hollow body (5).
8. A unit as claimed in claim 1, **characterised in that** between the hot water delivery means (2) and the movable hollow body (40) there is provided a plate (20) possessing a channel (21) with internally projecting ribs (22) for guiding the rim of a cup capsule (30) containing coffee powder.
9. A unit as claimed in claim 7, **characterised in that** said plate (20) is securely fixed to the hot water delivery means (2).
10. A unit as claimed in claim 7, **characterised in that** said support ribs (22) are interrupted in that portion overlying said jacket (41).

#### Patentansprüche

40. 1. Automatische Ausgabeeinheit für Espressokaffee, welche Ausgabeeinrichtungen (2) für heißes Wasser und eine zur Aufnahme von Kaffeepulver oder einer Kapsel vorgesehene Kammer (47,152) aufweist, welche dafür vorgesehen ist, in eine dichtende Beziehung mit den Ausgabeeinrichtungen bewegt zu werden, wobei die Kammer in der Form einer zylindrischen Umhüllung (73,41) starr mit einem beweglichen, hohlen Körper (7,40) ausgebildet ist, welcher dichtend auf einem festen, hohlen Körper (5, 50) montiert ist, um eine Kammer mit variablem Volumen zu bilden, welche über ein Zwei- oder Dreiegeventil wechselweise mit einer Quelle für unter Druck stehendes Wasser und der Ausgabe verbunden ist,  
**dadurch gekennzeichnet, dass** der bewegliche, hohle Körper (7,40) auf zwei Stäben (3,23) gleitend gelagert ist, welche den festen, hohlen Körper mit den Ausgabeeinrichtungen für heißes Wasser ver-

binden, und dass er in seiner Ruheposition mittels elastischer Einrichtungen (72,51) in Kontakt mit dem festen, hohlen Körper gehalten ist.

2. Einheit nach Anspruch 1,  
**dadurch gekennzeichnet, dass** die Unterseite der Kammer (27), welche das Kaffeepulver enthält, aus einer perforierten Wand besteht, welche elastisch gegen die Kraft einer Feder verschiebbar ist.

3. Einheit nach Anspruch 1,  
**dadurch gekennzeichnet, dass** die Unterseite der Kammer (152), welche das Kaffeepulver enthält, aus einem Kolben (9) besteht, welcher eine axiale Leitung (91) zur Ausgabe der infundierten Flüssigkeit aufweist, welche sich in einen Schlauch (92) erstreckt, welcher dichtend durch die Unterseite des beweglichen, hohlen Körpers und die Unterseite des festen, hohlen Körpers verläuft.

4. Einheit nach Anspruch 1,  
**dadurch gekennzeichnet, dass** zwischen dem beweglichen, hohlen Körper und den Ausgabeeinrichtungen für heißes Wasser ein ringförmiger Körper (15) vorgesehen ist, welcher auf der Außenseite der Umhüllung (73) montiert ist und dazu in der Lage ist, eine Rückzugsstellung in Kontakt mit dem beweglichen, hohlen Körper und eine vorgescho- bene Position in Kontakt mit den Ausgabeeinrich- tungen einzunehmen.

5. Einheit nach Anspruch 4,  
**dadurch gekennzeichnet, dass** zwischen dem ringförmigen Körper (15) und dem beweglichen, hohlen Körper (7) elastische Einrichtungen (16) vorgesehen sind, welche dafür vorgesehen sind, den ringförmigen Körper in Kontakt mit den Ausgabeeinrichtungen zu bringen, sowie eine elastische Schaltklinke (17), welche dafür vorgesehen ist, den ringförmigen Körper in Kontakt mit dem hohlen Körper zu halten.

6. Einheit nach Anspruch 4,  
**dadurch gekennzeichnet, dass** der ringförmige Körper (15) eine im wesentlichen radiale Leitung (151) aufweist, durch welche das lose Kaffeepulver eingeführt wird.

7. Einheit nach Anspruch 4,  
**dadurch gekennzeichnet, dass** der ringförmige Körper (15) gleitend auf den Stäben (3) montiert ist, welche die Ausgabeeinrichtungen (2) für das heiße Wasser mit dem festen, hohlen Körper verbinden.

8. Einheit nach Anspruch 1,  
**dadurch gekennzeichnet, dass** zwischen den Ausgabeeinrichtungen (2) für heißes Wasser und dem beweglichen, hohlen Körper (40) eine Platte (20) vorgesehen ist, welche einen Kanal (21) mit sich nach innen erstreckenden Rippen (22) zum Führen des Randes einer Tassenkapsel (30), welche Kaffeepulver beinhaltet, aufweist.

9. Einheit nach Anspruch 7,  
**dadurch gekennzeichnet, dass** die Platte (20) si- cher an den Ausgabeeinrichtungen (2) für heißes Wasser befestigt ist.

10. Einheit nach Anspruch 7,  
**dadurch gekennzeichnet, dass** die Tragerippen (22) in demjenigen Bereich, der über der Umhüllung (41) liegt, unterbrochen sind.

**Revendications**

1. Unité de distribution automatique d'un café expresso, comprenant un dispositif (2) de transmission d'eau chaude et, pour contenir une capsule ou de la poudre de café, un compartiment (47, 152) destiné à être déplacé en position de coopération étanche contre le dispositif de transmission, le com- partiment étant sous forme d'une enveloppe cylindrique (73, 41) associée rigidement à un corps creux mobile (7, 40) qui est monté de façon étanche sur un corps creux fixe (5, 50) pour la création d'une chambre de volume variable raccordée par une soupape à deux ou trois voies en alternance à une source d'eau soue pression et à une évacuation, **caractérisée en ce que** le corps creux mobile (7, 40) peut coulisser sur deux tiges (3, 23) qui raccordent le corps creux fixe au dispositif de transmission d'eau chaude, et il est maintenu dans sa position de repos au contact du corps creux fixe par un dispositif élastique (72, 51).

2. Unité selon la revendication 1, **caractérisée en ce que** la base du compartiment (47) qui contient de la poudre de café est constituée d'une paroi perfo- rée mobile élastiquement de façon antagoniste à un ressort.

3. Unité selon la revendication 1, **caractérisée en ce que** la base du compartiment (152) qui contient de la poudre de café est constituée d'un piston (9) qui présente, pour la sortie du liquide qui a infusé, un conduit axial (91) qui s'étend dans un tube (92) qui traverse sous forma étanche la base du corps creux mobile et la base du corps creux fixe.

4. Unité selon la revendication 1, **caractérisée en ce que**, entre le corps creux mobile et le dispositif de transmission d'eau chaude, est disposé un corps annulaire (15) qui est monté à l'extérieur de l'enve- llappe (73) et qui peut prendre une position retirée au contact du corps creux mobile et une position

avancée au contact du dispositif de transmission.

5. Unité selon la revendication 4, **caractérisée en ce que**, entre le corps annulaire (15) et le corps creux mobile (7), sont disposés un dispositif élastique (16) destiné à faire avancer le corps annulaire au contact du dispositif de transmission, et un cliquet élastique (17) destiné à maintenir le corps annulaire au contact du corps creux.

10

6. Unité selon la revendication 4, **caractérisée en ce que** le corps annulaire (15) présente un conduit pratiquement radial (151) par lequel de la poudre fluide de café est introduite.

15

7. Unité selon la revendication 4, **caractérisée en ce que** le corps annulaire (15) est monté de façon coulissante sur les tiges (3) qui raccordent le dispositif (2) de transmission d'eau chaude au corps creux fixe (5).

20

8. Unité selon la revendication 1, **caractérisée en ce que**, entre le dispositif de transmission d'eau chaude (2) et le corps creux mobile (40), est disposée une plaque (20) qui possède un canal (21) ayant des nervures (22) dépassent vers l'intérieur et destinées à guider le bord d'une capsule (30) en forme de cuvette contenant de la poudre de café.

9. Unité selon la revendication 7, **caractérisée en ce que** la plaque (20) est fermement fixée au dispositif de transmission d'eau chaude (2).

10. Unité selon la revendication 7, **caractérisée en ce que** les nervures de support (22) sont interrompues dans la partie qui recouvre l'enveloppe (41).

35

40

45

50

55

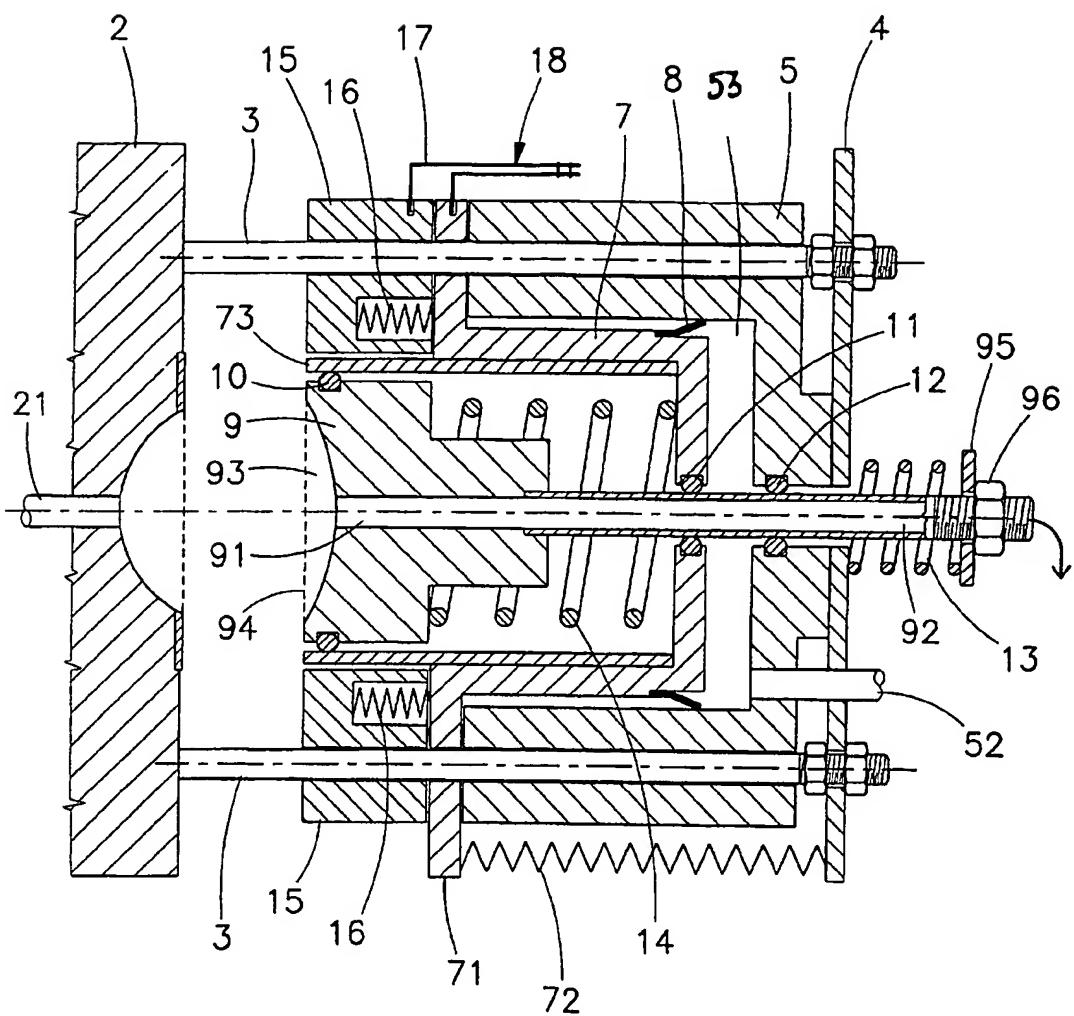


FIG. 1

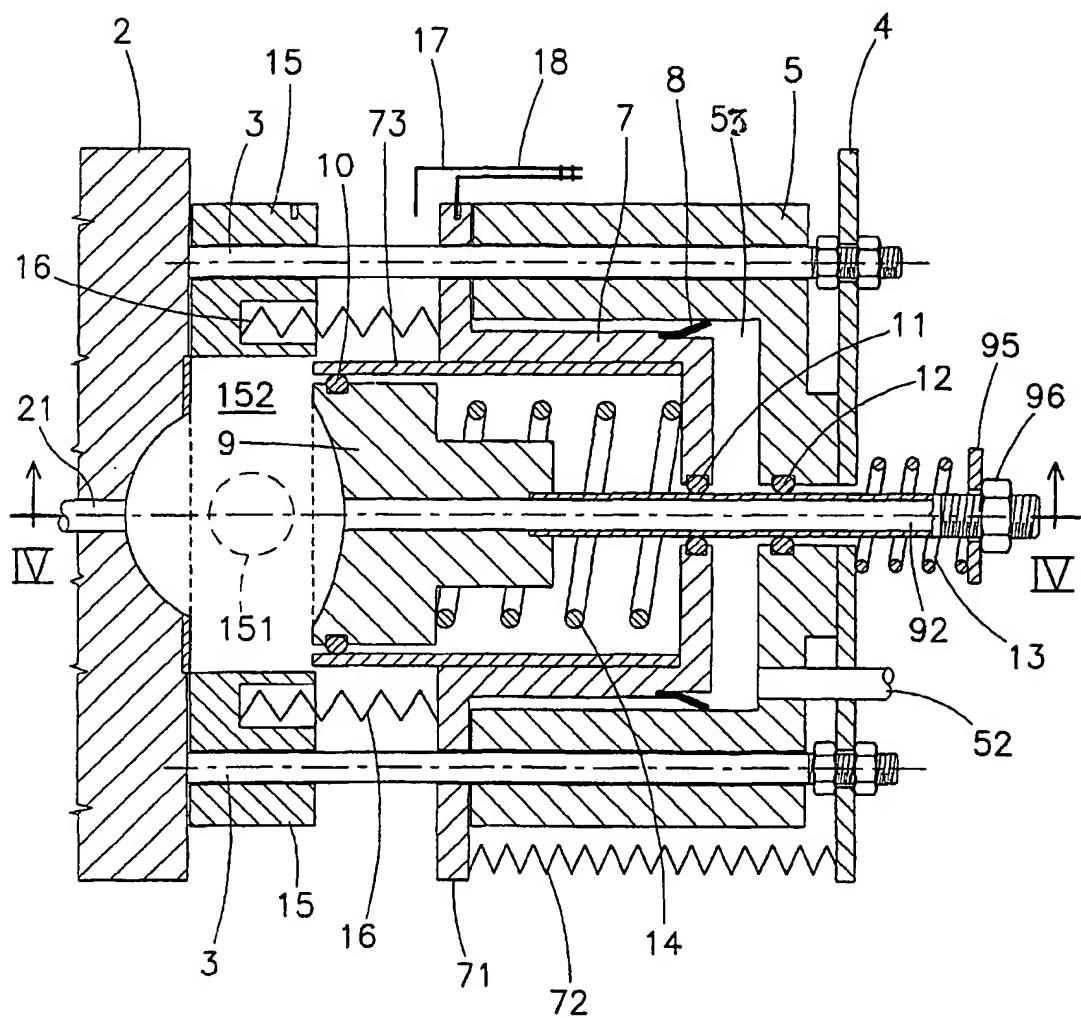
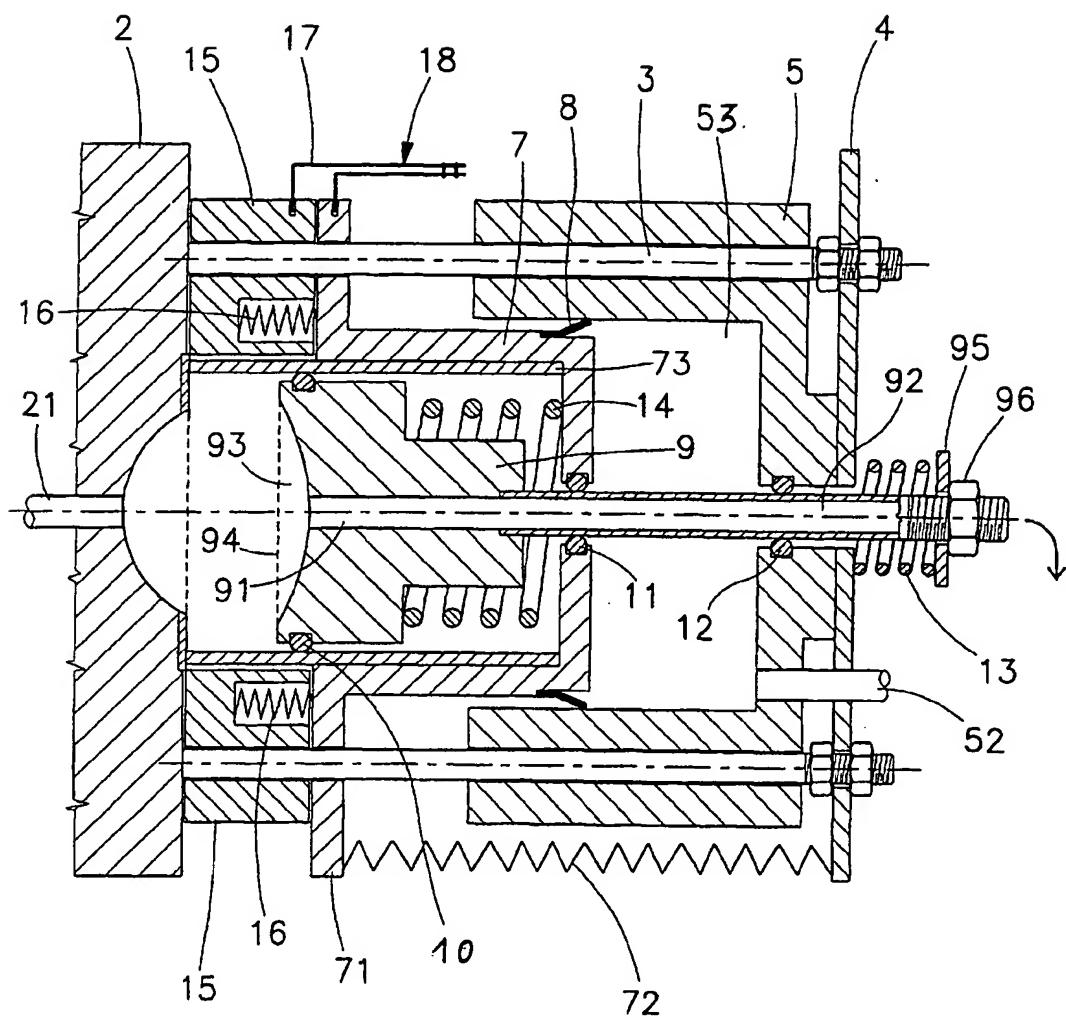


FIG.2

FIG.3

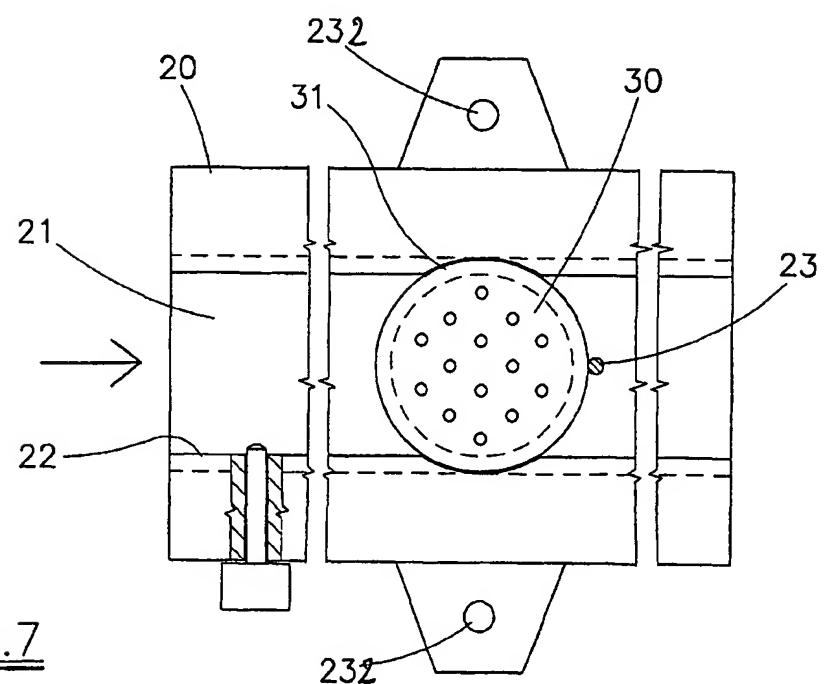
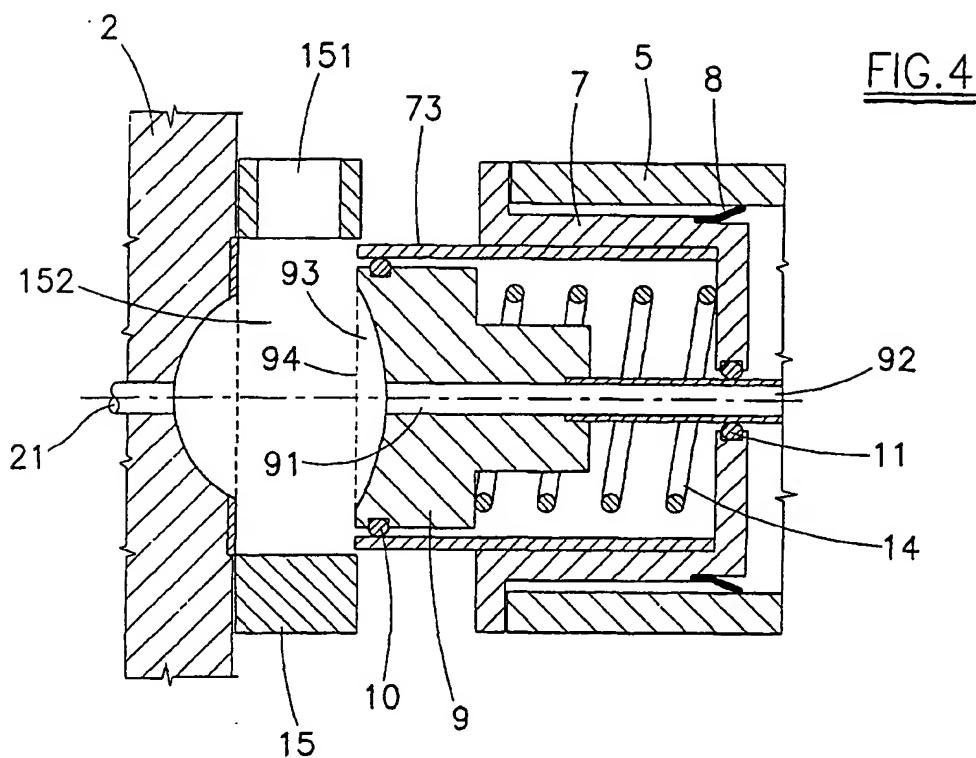


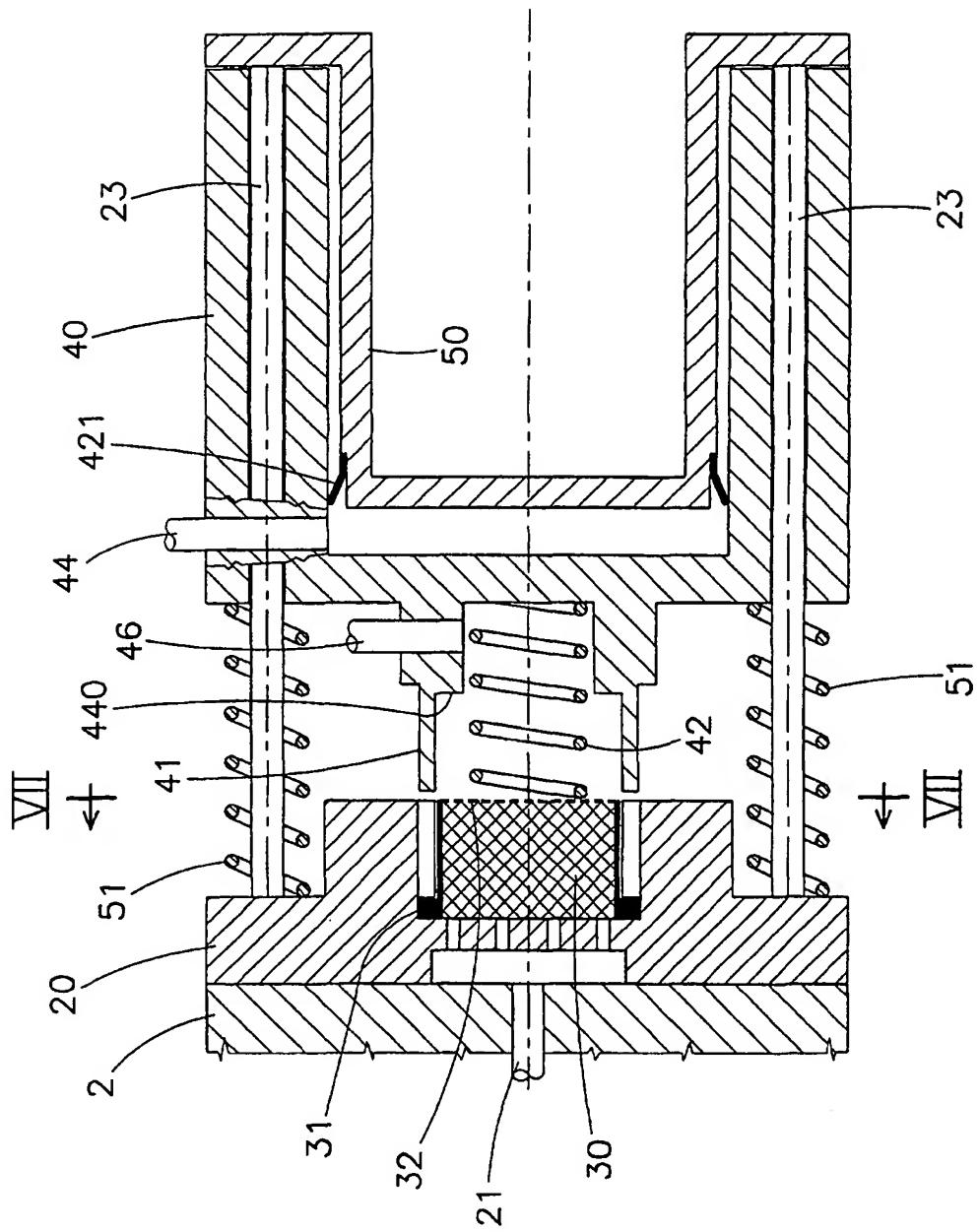
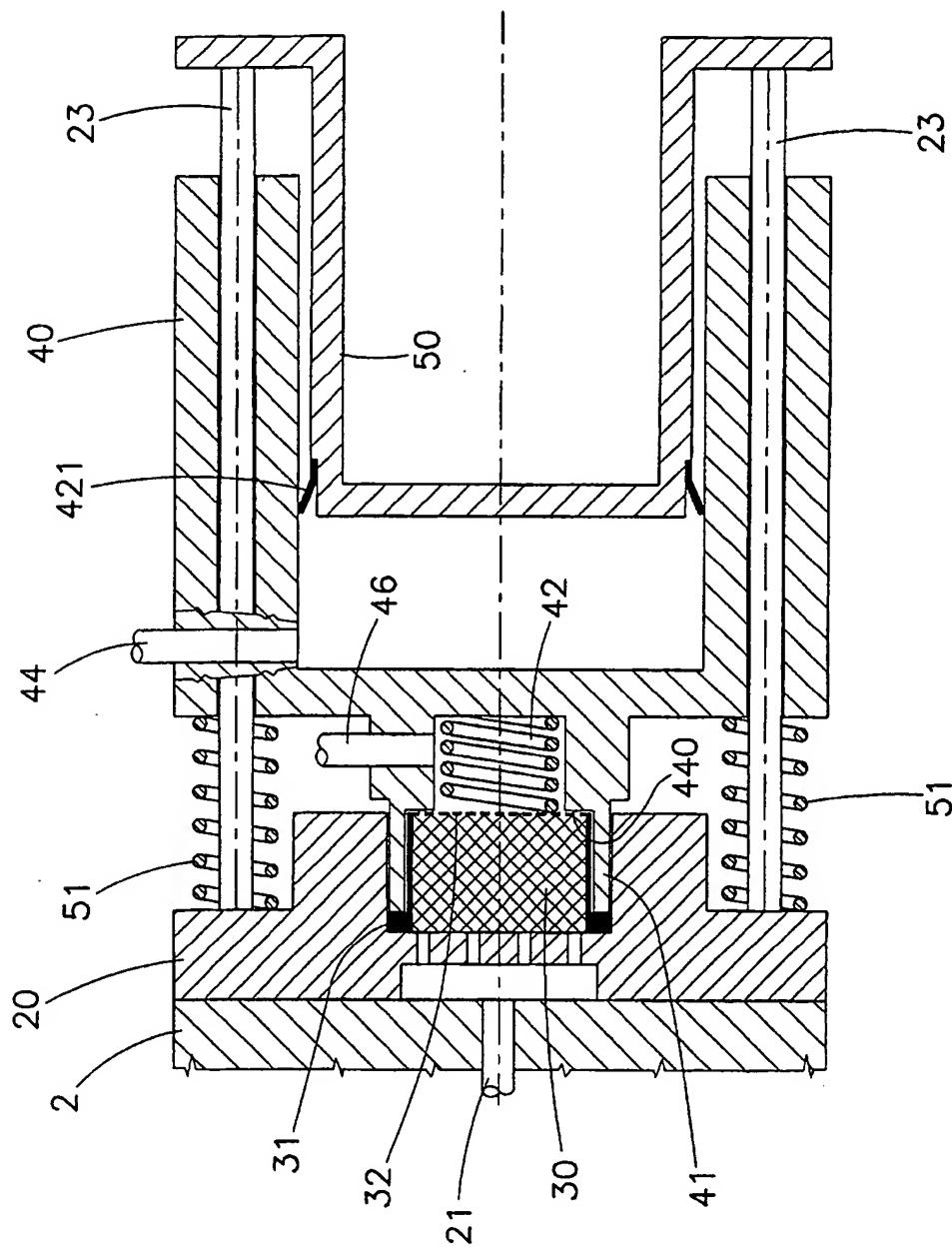
FIG. 5

FIG.6



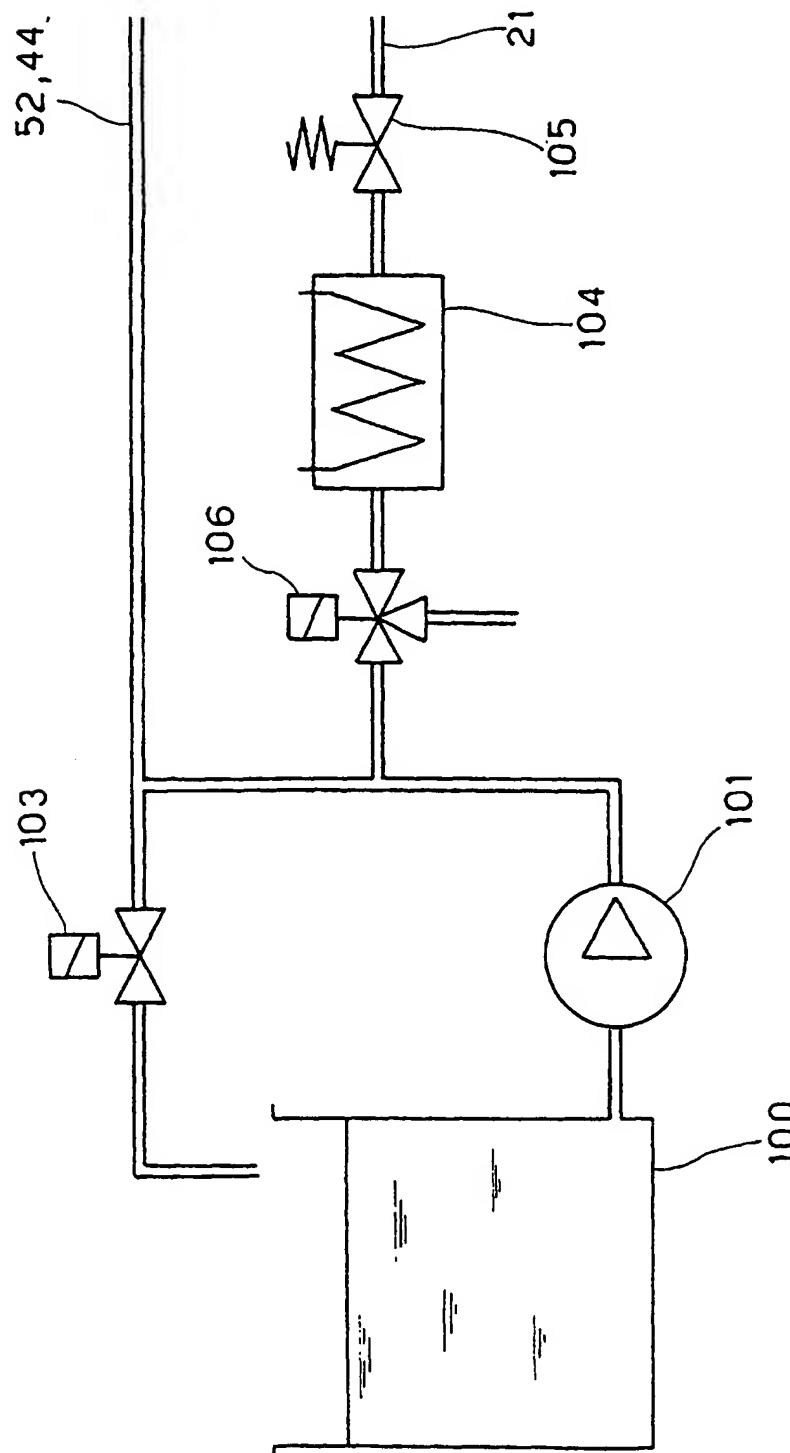


FIG. 8.